Roll No. : .....

Total No. of Questions : **11**] [Total No. of Printed Pages : **4**

BFMS–421

M.Sc. (Final) Examination, 2023

CHEMISTRY

Paper – V (CH-501)

(Spectroscopy, Photochemistry and Computer in Chemistry)

*Time : **3** Hours*] [*Maximum Marks : **75***

Section–A **(Marks : 2 × 10 = 20)**

Note :– Answer all *ten* questions (Answer limit **50** words). Each question carries **2** marks.

Section–B **(Marks : 5 × 5 = 25)**

Note :– Answer all *five* questions. Each question has internal choice (Answer limit **200** words). Each question carries **5** marks.

Section–C **(Marks : 10 × 3 = 30)**

Note :– Answer any *three* questions out of five (Answer limit **500** words). Each question carries **10** marks.

Section–A

1. (i) What is the frequency range in Alcohols ?

   (ii) Mention the factors on which absorption maximum for O–H stretching depends.

(iii) Why C^{12}, O^{16}, O^{18} and S^{32} do not Exhibit NMR Spectra ?

(iv) Why water and alcohol are not suitable solvent for ESR studies ?

(v) Define Quantum Yield.

(vi) Define photodegradation.

(vii) A compound exhibits peaks at M/e 86, 85, 44 (MR ion) 57 and 41. Give its structure.

(viii) Give outline Diagram of high resolution mass spectrometers.

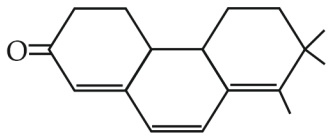
(ix) Define half life and average life.

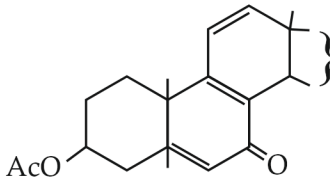
(x) Give extracted use of computer programmes from Cambridge Data Base.

Section–B

2. (a) Explain different methods for the assignment of metal-ligand vibration.

(b) Calculate λ_{max} for the following compounds :

(i) 

(ii) 

Or

(a) Explain instrumentation, sample handling and application IR spectroscopy.

(b) Explain ORD and CD.

3. Write short notes on the following :

(a) Spin-spin Interaction for complex

(b) Fourier transform technique

Or

Write short notes on the following :

(a) Two-dimensional NMR spectroscopy

(b) ESR spectroscopy

4. (a) Explain interaction of EM Radiation with matter.

(b) Explain actinometry.

Or

Write short notes on the following :

(a) Intramolecular reaction of carbonyl compound

(b) Cyclohexadienones

5. Explain principle, experimental procedures to solid state reaction.

Or

Explain McLafferty Rearrangement and New superconductors.

6. Write short notes on the following :

(a) Numerical integration method

(b) Word processing software

Or

(a) Explain linear simultaneous equation.

(b) Explain development of small computer codes for Vander Waals equation.

Section–C

7. Explain the various electromagnetic transition, B.L. Law and effect of solvent on electronic transition.

8. What is C–13 NMR Spectroscopy ? Explain for heteroaromatic and aliphatic olefinic.

9. Explain photochemistry of Aromatic compounds including isomerisation and substitution.

10. What is Mass Spectral Fragmentation of Organic Compounds ? Explain in detail.

11. Explain working of any of two computer programmes, such as LOTUS/ FOXPRO/MOPAC.